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AUTHOR	Stevens, Barbara
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ABSTRACT

A study was conducted to determine the role of story grammar in children's ability to detect misplaced information in simple narratives. The subjects, 27 second grade and 25 fifth grade students, each read six stories that had been developed for the study. The stories were one-episode narratives comprised of six grammatical categories with two propositions per category. The six categories were setting, initiating event, internal response, attempt, consequence, and reaction. Six event sequence orders were used in the stories, five representing either the movement of the internal response or the consequences, and the sixth representing the correct event ordering. After reading a story, each student was asked to answer a series of probe questions about it to discover how readily he or she had noticed the order violations. After answering the questions, the student was asked to construct a better story using the same sentences. The results indicated that children judged correctly ordered stories to be "well-formed" and "sensible," but frequently identified disordered stories as being "flawed." Developmental differences were found in the children's ability to use expectations for the sequence of a story, in determining when the story made sense, and in correctly reordering it. (FL)

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Technical Report No. 577

CHILDREN'S AWARENESS OF STORY ORDER

by

Barbara Stevens

Report from the Project on
Studies of Instructional Programming for the Individual Student

Steven R. Yussen
Faculty Associate

Wisconsin Research and Development Center
for Individualized Schooling
University of Wisconsin
Madison, Wisconsin

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ABSTRACT

The purpose of this study was to determine the role of story grammars in children's ability to detect misplaced information in simple narratives. The results indicated that children judged correctly ordered stories to be "well-formed" and "sensible," but frequently identified disordered stories to be "flawed." Developmental differences were found in children's abilities to utilize expectations for the sequence of a story in determining when the story made sense and in correctly reordering the story.

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INTRODUCTION

The structure of simple stories provides an interesting format for research into memory processes and reading comprehension. Mandler and Johnson (1972) have suggested that simple stories such as folktales, fables, and myths which have been passed down through generations orally are probably structured in such a way that they are easy for people to remember. Attempts have been made to describe the structure of simple stories (Rumelhart 1975; Mandler & Johnson 1977; Stein & Glenn 1977a). These descriptions of the format of simple stories are referred to as story grammars.

If story grammars can describe the structure of simple stories which have been passed down orally through generations, then it would logically follow that a similar structure must exist within an individual's thought processes which allows for the memory of the story. Such thought structures have been referred to as story schemata (Mandler & Johnson 1977), and are viewed as guiding expectations for the sequence of events within a story (Bartlett 1932; Rumelhart 1975; Thorndyke 1977; Mandler & Johnson 1977; Stein & Glenn 1977a). For example, when we are read a story we expect to hear a description of the characters before we hear the

conclusion of the story. Story schemata and expectations for the sequencing of events are thought to be formed based upon past experiences interacting in the world and on past experiences with stories both read and heard. As we experience events occurring in a certain sequence, we grow to expect that sequence of events in new experiences whether they occur in actuality or are gained vicariously. These expectations are useful in helping the reader or listener determine whether he has comprehended the presented information or whether the presented information is comprehensible.

The research to be presented within this paper examines the role that a story grammar plays in children's decisions of whether or not the presented information is comprehensible. If, in fact, children possess expectations for the sequencing of events in simple stories and use these expectations to monitor their comprehension, then comprehension can be facilitated better in educational settings during the early reading years by forming stories which contain a grammatical structure.

Constructive Approach to Comprehension

Research in the area of comprehension has been largely influenced by linguistic theory. Linguistic theory has regarded the deep structure of a sentence as sufficient to characterize information acquired and retained by the listener. This has been referred to as the interpretive approach to sentence memory (Katz & Postal 1964). The interpretive approach considers the meaning of the

sentence to be conveyed through the semantic interpretation.

In opposition to this theory is the constructive approach. In the constructive approach, sentences are viewed not as linguistic objects to be remembered, but as information used by the individual to construct semantic descriptions of situations. The constructive approach does not consider a linguistic analysis of the incoming information as sufficient in determining what is comprehended by the individual. The individual incorporates what he receives from the linguistic input into the body of knowledge that he already possesses, forming a holistic semantic description. Thus, the constructive approach stresses an active role of the information receiver.

Research supports the constructive approach to prose memory (Bransford, Barclay, & Franks 1972; Paris & Carter 1973; Paris & Upton 1976; Brown 1976). Bransford, Barclay, and Franks (1972) hypothesized that a deep structural analysis of input sentences may be necessary but not sufficient for what is retained in memory. Bransford et al. (1972) compared adult's memory for sentences which were identical in deep structure, but differed in the possible amount of inferred information (Three turtles rested on/beside a floating log and a fish swam beneath it/them.). Subjects were asked to identify from a list of sentences read to them, the exact ones previously heard. The results indicated that it was a more difficult task for the subjects to differentiate between the sentences heard and those not previously heard when inferences were possible.

Paris and Carter (1973) found similar results with children. These findings are in agreement with the constructive approach. Subjects used the information that they received from the linguistic input to form a holistic semantic description from which they were able to infer information. The constructivists argue that a holistic semantic description must be formed whenever inferences are made.

Paris and Upton (1976) have explored the development of semantic integration. Through directed questioning, Paris and Upton (1976) sought to determine whether there were developmental differences in children's memory for implicit versus explicit information in prose. They found improvement across grades (kindergarten through fifth grade) in ability to answer questions related to both explicit and implicit information. Paris and Upton (1976) also found evidence that when inferences in stories are comprehended, memory for the events in the story is better than when inferences are not comprehended. Comprehension, therefore, appears to be facilitated by attempts to infer information.

In order to make an inference, the temporal sequence of events and the logic between events must be understood. Piaget (1969) regarded temporal sequencing to be a primary difficulty in children's recall of narrative sequences. It therefore would be expected that preoperational children would have difficulty tracing the causes and effects in a narrative because of their lack of reversible thought. Brown (1976) tested this premise by presenting logical

event sequences to children (preschool, second, and fourth grade subjects) and testing their memory for the story. Brown's findings indicated that in reconstructing the stories, preschool children were capable of discriminating between events which were consistent versus inconsistent with the presented stories. The older children were more efficient than the younger children in rejecting inconsistent items. In reconstructing the stories, younger children chose the beginning and end events of the stories and filled in the middle events. The older children reconstructed the stories sequentially. Thus, even the preschool children were capable of reconstructing the ordered information as presented.

The findings of Bransford et al. (1972), Paris and Carter (1973), Paris and Upton (1973), and Brown (1976) indicate that both children and adults can integrate the meaning and relationships between sentences into holistic descriptions when they hear or read a prose selection. Syntactic information about what has occurred in which sentence is forgotten. A holistic description of the information, instead of the syntactic information, is gained through the process of semantic integration. Semantic integration aids comprehension and memory for ideas being communicated, but exact recall of the sentences may be impaired.

The Structure of Stories

Both Piaget (Piaget & Inhelder 1973) and Bartlett (1932) view memory as a continuously changing constructive process in which the

individual takes an active role. Piaget predicted that, with time, distortions and omissions would occur as well as qualitative improvements in memory. The individual is continuously reorganizing information in the process of assimilation. Thus, the individual reorganizes past information and reconstructs connections or central points which cause improvements in memory. Bartlett (1932) noticed that irregular stories which he presented to his subjects were recalled in a more regular format when he asked for recall a month later. Bartlett explained his finding, that presented irregular stories became more regular over time, as being due to the use of a story schema in recall. A story schema is a representational structure existing within an individual's thought processes which guides expectations for the sequence of events within a story. When individuals reconstruct stories, they use this schema to fill in any parts which they cannot recall.

Since Bartlett, other researchers (Rumelhart 1975; Mandler & Johnson 1977; Thorndyke 1977; Stein & Glenn 1977) have attempted to define the structure of stories in an attempt to understand story schemata. By developing story grammars, it is possible to predict how people encode and represent the information contained in narratives.

Rumelhart (1975) was the first person to develop a story grammar. The grammar includes both syntactic and semantic rules. Rumelhart's grammar was considered difficult to apply to a broad range of stories (Mandler & Johnson 1977). Based on Rumelhart's

work, other attempts have been made to develop a story grammar (Stein & Glenn 1977a; Mandler & Johnson 1977; Thorndyke 1977) which could be applied to a variety of stories. The Mandler and Johnson (1977) and the Stein and Glenn (1977a) grammars combine syntactic and semantic information providing a more usable grammar for predicting the quality of comprehension which will occur. Mandler and Johnson's grammar was derived from the inspection of traditional folktales (as mentioned previously, folktales being passed down through generations aurally are suspected of containing a structure which is easily memorable). Stein and Glenn developed a story grammar to describe a simple story which is more simplified than the Mandler and Johnson grammar.

The Stein and Glenn grammar describes the format of a simple story as consisting of two parts: a setting and an episode. The setting occurs in the beginning of the story and introduces a protagonist including social, physical, and temporal information (e.g., Once there was a boy named Alan who had lots of toys.). The setting is considered to be a single category. A category is a primary unit of analysis referring to a type of information serving a specific function in the story, and occurring in a fixed temporal order. The episode contains five categories. Because the episode is an organization of categories, it is considered the primary higher order unit of analysis (Stein 1978).

The first of the five categories included within the episode is the initiating event--an event or action causing a change in the

environment of the story and initiating the formation of a goal (e.g., One day Alan's sister was playing with his toy car and broke it.). The internal response gives the reader the reasoning behind the character's subsequent behavior (cognitions, feelings) and a clear statement of the goal (e.g., Alan knew that crying wouldn't do any good and he had to fix his car). The attempt contains the actions which occur in response to the goal (e.g., So he went to his father's workbench and got some glue and a brush). The consequence describes either the attainment or the non-attainment of the goal (Alan glued his car together and it was as good as new.). The ending of the story is the reaction in which the character responds affectively to the consequence or the effects of the consequence (e.g., Alan was pleased with himself and forgave his sister). Each of the categories within the episode is either an action or a cognition. The initiating event, attempt, and consequence express actions in the story (e.g., Alan's sister was playing...and broke it; so he went...and got some glue and a brush; finally, Alan glued...). The internal response and reaction express thoughts or cognitions of the main character (e.g., Alan knew...; Alan was pleased...and forgave his sister.). (See Appendix A.)

Using this grammar, Stein and her colleagues (Stein & Glenn 1977a, b, c; Stein & Nezworski 1978) have attempted to examine the role of schemata in the comprehension of simple stories. Based on the assumption that a grammar describes the schema an individual uses in processing information contained within a story, Stein and

Glenn (1977b) asked kindergarteners, third, and fifth graders to make up a story given its setting. They found it possible to use their grammar to parse and describe the stories produced by the subjects. The relationships between statements within the produced stories were noted. In examining these relationships, it appeared that stories differed in the logical structures used. The younger children formed stories either without causal relationships between sentences or with poorly elaborated relationships. The older children formed stories which contained causal relationships between sentences. Stein and Glenn concluded that the use of logical structures develops with age, but even young children possess a schema for generating stories.

In further exploration of the existence of story schemata, Stein and Glenn (1977c) examined children's (first and fifth graders) recall of stories which contained all 6 categories versus stories with one category deleted (either the initiating event, internal response, attempt, consequence, or reaction category). They hypothesized that if a schema is used to encode information from stories, then when a category is missing the information contained in that missing category should be added. In addition, if the missing information is not discerned, then recall of the remainder of the story will be disrupted. Stein and Glenn (1977c) found that the first graders recalled significantly less information across story conditions than fifth graders. Within story conditions, there were significant decreases in recall for the first graders when the

initiating event or the consequence was deleted versus when all six categories were presented. For the fifth graders, deletion of the initiating event caused significant decreases in recall, but not the deletion of the consequence. Deletion of the internal response, attempt, or reaction did not cause a significant decrease in recall for either grade.

Stein and Glenn (1977c) found that the majority of new information added in recall was of the type deleted. Fifth graders added more new information than first graders except when well formed stories or stories without the reaction were presented. Significant increases in inferential inclusions, in comparison to the control group, occurred when the initiating event, attempt, or consequence was deleted. Deletion of the internal response or reaction category did not significantly effect the number of inferences added. When both the conditions for new additions and for recall were rank ordered, the same pattern occurred. When one of the action categories was deleted, more new information was added in recall than when one of the cognition categories was deleted.

This body of research performed by Stein and Glenn (Stein & Glenn 1977a, b, c) indicates that a schema does exist for encoding and recalling simple stories. In addition, some of the parts of the story (the action categories) are better recalled than others (the cognition categories). Young children appear to favor action sequences in their recall of stories (Brown 1976; Bronckart & Sinclair 1973; Piaget 1969).

Stein and Glenn's (1977c) finding that first and fifth graders recall differs indicates that there are developmental differences in children's conception of story structure.

Further support for the development of schemata for stories can be found in Mandler's (1978) research. Mandler presented well-ordered and interleaved stories to second, fourth, sixth graders, and college aged subjects. The well-ordered or standard version presented a setting for a two episode story followed by each episode. The interleaved version presented: (1) a combined setting for both stories; (2) the beginning of the first story; (3) the beginning of the second story; (4) the reaction of the first story; (5) the reaction of the second story; (6) the attempt of the first story; (7) the attempt of the second story; (8) the outcome of the first story; (9) the outcome of the second story; (10) the ending of the first story; (11) the ending of the second story. The study was designed with two purposes: (1) to examine the effect of the activation of the story schema on recall when stories were well-ordered versus interleaved and (2) to examine developmental differences in the use of the story schema in the process of recall. Quality of recall was determined by the number of additions made to the presented stories during recall.

In recalling interleaved stories, children between second and sixth grade used an ideal structure while adults attempted to interleave the stories. The children, therefore, showed more

dependence on a story schema in recalling the interleaved stories than the adults. Yet, the adults' ability to recall standard stories was better than the children's (below fourth grade). These findings indicate that story schemata develop with age.

Recall of standard stories improved between second and fourth grade with no significant improvement of recall past fourth grade. The only significant improvements in recall for the interleaved stories occurred between the sixth grade and the adult years. The quality of recall showed developmental differences with the number of additions increasing with age in both recall of standard and interleaved stories. At all ages, more distortions were noted in the interleaved stories than in the standard stories. Similar results have been found with adults recalling well-ordered stories better than disordered stories (Thorndyke 1977; Stein & Nezworski 1978). Children do not show the flexibility of adults in using a story schema to recall stories either well-ordered or interleaved. There are two possible explanations for this lack of flexibility. It may be a cognitive processing problem in which the child has an idea of how he should accomplish the given task of recalling the interleaved story, but does not have the processing skills to perform in that manner. The other possibility is that the child lacks awareness of the need to act upon the incoming information in some manner in order to remember the story. In other words, it may be a metacognitive problem or, more specifically, a problem of metacomprehension.

Metacomprehension

Knowledge and cognition about cognitive phenomena has been referred to as metacognition (Flavell 1978). Flavell views metacognitive experiences as resulting from cognitive goals and cognitive actions. Cognitive goals generally influence cognitive action. As an example of this, Frederickson (1972) found that adults process information differently when asked to read a passage in order to generate inferences to solve a problem as compared with a condition in which they were instructed to remember the passage. Cognitive goals can also activate the memory for stored metacognitive knowledge relevant to the goal. An example of this would be an individual, who is given directions to a friend's house (the goal), realizing that he is not very good at generating spatial representations from verbal directions (metacognition) and therefore decides to write the directions down. The individual can then refer back to the directions. In this way, the metacognitive knowledge serves as a mnemonic in aiding the individual in processing incoming information.

Metacognition appears to occur as other cognitive skills are developed and learned by the child (Flavell 1978). In order to recognize that incoming information needs to be acted upon to be made use of in the future, the young child must first view himself as an active agent capable of controlling his cognitions (Hagen 1971). The young child must also develop the ability to perceive beyond the present in order to gain insight into the relationship between present and future behaviors. Abilities to predict, introspect, and retrospect enable a

person to notice properties of himself, the task at hand, and mnemonic strategies which covary with memory outcomes (Flavell 1978). With age and experience, the young child develops these abilities (Bransford, Nitsch, & Franks 1977; Brown 1975; Brown & Smiley 1977) and begins to gain a realistic view of his capabilities in cognitive situations.

Metacognitive experiences can occur in a variety of situations. One of these situations is the comprehension of written or spoken material. Markman (1978) suggests that in order to comprehend information, the information must include a structure or organization. The young child's lack of awareness of the structure of prose is a metacognitive problem which affects comprehension and recall. The metacognition that a structure cannot be found to fit the incoming information, warns the information receiver that the information is not understandable. Likewise, if the presented information does not fit the expectations held by the listener or reader, then he should realize that the information has not been comprehended (Markman 1978).

Inferential skills are also important in comprehension. Young children tend to analyze their understanding of information based on its truth value versus its logical or linguistic structure (Markman, 1978b). The observation that there are inconsistent statements within a passage should indicate that it is not comprehensible. Since both children's awareness of the structure of stories (Mandler & Johnson 1977; Stein & Glenn 1977a, b, c) and the degree to which they process information (Paris & Lindauer

1976; Paris & Upton 1976) develop with age, young children can be expected to have more difficulty than older children in realizing that presented information is not understandable (Markman, 1978b).

Markman (1977, 1978a, b) has investigated the role of inferencing in metacomprehension. Markman's research indicates that older children are better able to notice inconsistencies in directions (Markman 1977) as well as in essays (Markman 1978a). The children in Markman's studies failed to notice inconsistencies except in situations where either they performed the presented incomplete instructions (Markman 1977) or they were notified that something did not make sense (Markman 1978a). To detect a problem in instructions, inferential processing is a necessity. Markman's finding that children, 10 to 11 years old, can detect inconsistencies when notified of their existence (Markman 1978a) indicates that children are capable of inferential processing. The finding that children do not notice inconsistencies unless notified (Markman 1978a) indicates that they do not know when to utilize this strategic skill.

Brown and Smiley (1977) and Yussen, Mathews, Buss, and Kane (1980) have investigated children's awareness of structure in prose passages. Brown and Smiley (1977) attempted to determine whether the young child is able to determine the structural importance of units in a prose passage. Subjects included third, fifth, and seventh graders and college-aged students. Their results indicated that there was a gradual development of the ability to distinguish

levels of importance. The third graders were not able to reliably distinguish levels of importance. Fifth graders could isolate the most important structural units from the passage, seventh graders could distinguish low, medium and high levels of importance, while the college students were able to place the units into four levels of importance. When the subjects were asked to recall the passages, all age groups recalled the units of the passage following the adults' rated importance of structural units. Therefore, the most important units are recalled most often at all ages even without awareness of the structural importance of prose passages.

Yussen, Mathews, Buss, and Kane (1980) examined the relationship between children's abilities to distinguish the most important parts of the story (the action sequences, i.e., the initiating event, attempt, and consequence) and their recall of the story. Yussen et al. found a moderate relationship at the fifth grade, but no significant relationship at the second grade. Yussen et al. state: "...the relation between metacognitive knowledge and actual processing is most likely to be strong when the knowledge can be used to guide performance in a functional way. Examples might include using knowledge of story structure to rearrange disordered passages, to judge the author's intent or style, and to comprehend ambiguous passages." (p. 219). If this is true, it is not surprising that Yussen et al. did not find a high relationship between importance ratings and recall.

Statement of Purpose

The research presented here examines children's awareness of well-ordered and ill-ordered stories. Children's metacomprehension is examined through a series of probe questions and by asking the subjects to construct good stories given the parts of the presented stories. This method allows investigation of the relationship between children's awareness of story structure and their actual abilities to process information. The children were asked to use their awareness of the order problems in the presented stories to aid them in constructing good stories (Yussen et al. 1980).

In order to examine the salience of the order of the categories in judging whether a story was comprehensible, juxtaposed stories were presented to the subjects. Each story contained one juxtaposition of either the consequence or the internal response category. These two categories were chosen for juxtaposing for several reasons. First, one represents an action category (the consequence), while the other represents a cognition category (the internal response). Secondly, previous research indicates that the consequence category is one of the most often recalled categories, while the internal response is one of the least frequently recalled categories. Third, Stein (1976) has found that movement of the consequence category within a story affects the recall of second and sixth graders differently. In the second grade, all movements of the consequence significantly decreased recall while in the sixth grade, recall decreased significantly

when the consequence was moved 1 or 3 positions, with no significant decrease when it was moved 2 positions. When the consequence is moved 2 positions, there is a direct causal sequence at the beginning with the initiating event and the consequence being adjacent and the story proceeds without any further consequence. Movement of the internal response to any position 1 to 3 categories away from its original position did not affect recall at either the second or the sixth grade level.

Recall and reconstruction have been used as an index of comprehension with the presupposition that poorly understood material will not be well remembered. A close relationship appears to exist between judgments of comprehensibility and recall of stories, at least for adults (Bransford & Johnson 1977; Thorndyke 1977). Stein and Nezworski (1978) found that their adult subjects reconstructed stories more accurately when the presented stories followed the grammar versus when the stories were slightly misordered or randomly ordered. Other research shows that even children as young as six make few errors in recalling simple stories (Mandler & Johnson 1977; Stein & Glenn 1977a). It appears that when a story sequence corresponds to the expected sequence, there seems to be little or no difficulty recalling the temporal order of events (Stein & Nezworski 1978; Mandler & Johnson 1977; Stein & Glenn 1977c).

As one mean of determining children's awareness of story order, the present study used a reconstruction task instead of using

a recall task. Reconstruction was chosen as a task in an attempt to eliminate the contamination of such factors as memory load and recency effects. Following a series of probe questions related to the text, children were presented with the complete text in parts to reconstruct.

The major hypothesis of this study was that age differences would be found in children's (a) awareness of story elements out of their customary order, and (b) abilities to place the propositions in the story into an order conforming to the Stein and Glenn (1977a) grammar. Older children were expected to be more aware of disordered story elements than younger children as determined by a difference in the mean number of probes necessary for the younger children to recognize the order violations. Older children were also expected to place the stories into the correct order a significantly greater number of times than the younger ones. These predictions were based on the assumption that older children have more well developed story schemata than younger children, probably due to their greater experience in reading and listening to stories.

Another hypothesis of the study was that there would be a significant difference in the impact of the different story sequences on the performance of the subjects. This was predicted to be reflected (a) by the mean number of probes necessary for the subjects to notice the order violations across age groups and (b) by whether or not the juxtaposed story was placed into the correct ordering as determined by the Stein and Glenn grammar

(1977a). Displacement of the consequence was expected to create the impression of greater disorganization than movement of the internal response. This expectation was based on Stein's (1976) findings that the movement of the internal response one to three positions from its origin did not affect recall for second or sixth graders, while movement of the consequence did effect recall for children in both grades. Since movement of the internal response does not affect recall, we hypothesized that stories in which the internal response was displaced would require greater probing before being detected as flawed than would the stories in which the consequence was moved. In reordering the stories, it was expected that the more disorganized the presented story, the more difficult it would be to construct a well-ordered story. Therefore, it was hypothesized that the stories in which the internal response was moved would be correctly reordered a significantly higher number of times than the stories in which the consequence was moved.

The distance which the category in the juxtaposed story was moved was expected to be a factor in determining the number of probes necessary to notice the order violation. Distance was also expected to affect whether or not the juxtaposed story was placed into the correct ordering. As the category was moved further from its place of origin, the story was thought to become more disorganized. We expected that the less distance the category was moved, the higher the mean number of probes needed to notice the juxtaposition and the greater the number of times the story would be

placed into the correct ordering.

In summary, this study was conducted as an attempt to answer questions pertaining to (1) how aware children are of whether simple stories are comprehensible, and (2) whether the determination of the comprehensibility of a story is made through the use of a story schema composed similar to the Stein and Glenn grammar. The results were also expected to indicate whether there are developmental differences between second and fifth grade in determining what a comprehensible story is, and the structures which children think form good stories.

METHODS

Subjects

Subjects included 27 second graders and 25 fifth graders from a parochial school in a small town bordering Madison, Wisconsin. In the second grade there were 10 males and 17 females. The mean age of the second graders was 8 years and 2 months (S.D. = 3.30 months). In the fifth grade there were 9 males and 16 females. The mean age of the fifth graders was 11 years and 1 month (S.D. = 4.04 months). All subjects were white and were native English speakers. The teachers of the subjects excluded, from the study, children who had reading problems.

Materials and Design

Six simple stories were developed for use in the study. (See Appendix B.) Three of the stories were written by Stein following the grammar outlined by Stein and Glenn (1977). The other three stories were developed by Yussen, Mathews, Buss, and Kane (1980), and are comparable to three developed by Stein.[1]

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[1] Yussen et al. compared their stories to those composed by Stein by asking college students to determine which stories were written by one author and which by another. The results indicated that the studencs could not significantly detect differences in authorship.

Each story was a one-episode narrative comprised of six grammatical categories with two propositions per category. The six categories included setting, initiating event, internal response, attempt, consequence, and reaction.

Six event sequence orders were chosen for use (see Appendix A). Five of these orders represented either the movement of the internal response or the consequence. The sixth order was the correct story ordering as defined by the Stein and Glenn grammar (1977). In choosing the 5 juxtaposed orders several considerations were kept in mind. First, we did not want to change either the beginnings or endings of the stories. Secondly, we were interested in juxtaposing the consequence and internal response categories since they represented the most and least frequently recalled categories, respectively. Third, we were interested in comparing the effect of the distance of the movements of the categories from their original positions. We therefore chose to move: (1) the internal response and the consequence one position up; (2) the consequence two positions up and the internal response two positions down; and (3) the consequence 3 positions up. It is not possible to move the internal response 3 positions down without altering the end of the story. This movement of the consequence 3 positions up was performed in order to investigate whether the finding reported by Stein (1976)(that when the consequence was moved 1 or 3 positions but not 2 the recall of sixth graders was significantly decreased) would be reflected in the findings of the present study.

Since 6 event sequences were to be used with 6 stories there were 36 possible combinations of event sequences with stories. A Latin square design was used to determine which 6 stories were to be given to each subject and also to guarantee that the 36 stories would be utilized an equal number of times. This procedure was used to alleviate story effects which could have been associated with the differences in the semantics of the stories. The presentation of the six event sequences/stories to each subject was randomized in order to prevent a specific story or event sequence from being presented more often in one position than in another (in the beginning, middle, or end of the presentation order).

For presentation to the subjects each of the 36 stories were typed on separate sheets of paper (5 x 8 inches). The sentences from each story were typed on cards (6 x 2 inches) which were used by the subjects to arrange the sentences of the presented story into what they considered to be a good order.

Procedure

Subjects were tested individually by one of the two experimenters (a 20 year old male or a 26 year old female, the author). After greeting the child, the experimenter said, "I have 6 stories that I would like you to read and then I'm going to ask you some questions about each one." Each story was read aloud twice, once by the subject and once by the experimenter. After the experimenter

read the story, (s)he paused for a moment and then asked a series of probe questions (see Appendix C). The probe questions were designed to determine how readily the children noticed the order violations and moved from general comments (e.g., "That's the story") to more specific prompts (e.g., "Is any part of the story out of order?").

At the end of the series of probes, the subjects were asked to construct a better story than the one just presented. They did this using the six sentences from the earlier story. These sentences were typed on cards and presented to the children in a vertical column in random order.

RESULTS

Independent Measures

This Split Plot Repeated Measures design contained both within and between group independent variables. The within group variable was event sequence. The event sequences were the five juxtaposed and the one correctly ordered story sequence. There were three between group variables - grade, sex, and experimenter. The grade variable was tested for significance in order to investigate developmental differences. Sex was tested since there has been indication of six differences in reading abilities (Maccoby & Jacklin 1972). Experimenter differences were tested to determine whether the two experimenters differed in their styles of probing the subjects.

Dependent Measures

The six dependent measures utilized in this study were the following:

(1) Probe Score

Responses to the probe questions were scored to determine children's sensitivity to order violations. A score of between one and seven was given depending on when the child gave a clear indication that something was amiss in the story. The lower the score, the more readily the child responded. The prototypical and corresponding point values were as follows:

Points	Probe
1	If after the subject reads the story, s/he notices the juxtaposition.
2	If after the experimenter reads the story, the subject notices the juxtaposition.
3	If after the first nondirective probe (That's the story) the subject notices the juxtaposition.
4	If after the second problem (Does the story make sense) the subject notices the juxtaposition.
5	If after the third probe (Is any part of the story out of order) the subject notices the juxtaposition.
6	If the subject responds no to the third probe, but notices the juxtaposition when the experimenter explicitly points to the juxtaposed category and asks if it is out of order.
7	If the subject does not notice the juxtaposition of the category after shown the moved category.

An inter-rater agreement index was calculated for the probe scores assigned by having two raters independently score 12 stories and calculate the number of agreements divided by the total number of stories scored. The two raters were the author and a colleague. The colleague was informed of the hypotheses and the procedure of the study. Six of these stories were from each of the two grades and represented each of the six event sequences. The samples were from twelve different subjects who were randomly chosen. The agreement was .92.

(2) Recognizing whether the stories made sense or not.

This was determined by the subjects' responses of yes or no to the probe, "Does the story make sense?"

(3) Recognition of whether the story was out of order.

This was determined by the subjects' responses of yes or no to the probe, "Is any part of the story out of order?" This measure as well as the measures formerly mentioned were used to determine children's sensitivity to order violations.

(4) Logic Score

Responses to the question, "Why do you think that part is out of order?" were coded for the [illegible] used, according to the following scale:

(0) When the story was in the correct order and the subject recognized the correct order--applied only to the canonical story.

(1) Illogic was specifically pointed out or the subject pointed out the way events should have occurred or what was meant. Examples:
   (a) because if ____, then ____.
   (b) 'cause says ____, then ____ and ____.
   (c) normally ____.
   (d) Ann helps after her friend asks her to help.
   (e) Albert should have known that worms tasted good before he bit ____.

(2) The subject pointed out the order problem, with statements such as:
   (a) Because all are in different places and mixed up.
   (b) Because (the attempt) should be before (the consequence).

(3) The subject attempted to explain the illogic of the story but did so incorrectly. For example, "A box of rice crispies wouldn't be found under a stack of hay." (Note that this response points out an inter-sentence problem.)

(4) The child said nothing or said that (s)he did not know.

This measure was used to explore the thoughts used by the subjects in determining when a part of the story was out of order. Zero was included in the scale for coding of the correctly ordered story since

no part was out of order in that sequence.

An inter-rater agreement index was determined by the same two raters as before. This time, each rater independently scored 20 responses which were randomly chosen from a sample of 20 subjects. The sample was comprised of four cases of each event sequence, except the correctly ordered event sequence (since there was often no logic response given to the correctly ordered story). The inter-rater agreement was .95.

(5) Placement of the story into the correct order.

This was determined by the subject's construction of a story with the cards given to him/her towards the end of the procedure when the experimenter said, "Here are the parts to the story. Can you make a good story?" This measure was used to give an indication of whether the subjects used a schema similar to the one suggested by Stein and Glenn. The cards were presented vertically in random order.

(6) Inconsistent Responses.

An inconsistent response was an answer to a probe that did not fit the author's expectation for the logical progression through the series of probe questions. An example of an inconsistent response is a negative response to "Does the story make sense?" and a negative response to "Is any part of the story out of order?" In this situation the subject appears to notice a problem, but doesn't recognize the problem as being an order violation. This type of response was important to investigate since the probe score given in this example would have been determined by the first question, even though the

subject did not recognize that there was an order problem.

Preliminary Analyses

A Split Plot ANOVA (2 x 2 x 2 x 6) was performed to determine whether there were between group effects for grade, sex and experimenter on the within group variable of event sequence for each of the six dependent measures. There were no main effects found for sex or experimenter on any of the six dependent measures. Two significant interactions were found. A significant three way interaction (event x grade x experimenter) was found in the response to whether or not the story made sense (probe 2) ($F_{5,220} = 2.32$, $p < .04$) as well as in the logic used to explain why the story did not make sense ($F_{5,220} = 3.09$, $p < .01$). There is a more unstable pattern of means exhibited on both variables for the male experimenter versus the female experimenter. This pattern of the means may be due to the unequal number of subjects tested by the two experimenters or some differences in their styles of presenting the tasks to the children. No further effort was made to interpret these interactions because there was no conceptual explanation for them. Subsequent analyses focus on the between group variable of grade and on the within group variable of event sequence.

Overall Analyses of Variance

The 2 x 6 ANOVA (Grade x Event Sequence), without the sex or experimenter variables, showed significant differences on all six dependent measures (see Figures 1, 2, 3, 4, 5, 6). In the significant effects, fifth graders as contrasted with second graders:

(1) used fewer probes ($F_{1,50}$ (α = .01) = 20.26) (see Figure 1); (2) paced the stories into correct order more often ($F_{1,50}$ (α = .01) = 26.10) (see Figure 2); (3) used more mature logical reasoning ($F_{1,50}$ (α = .01) = 15.73) (see Figure 3); (4) recognized when the stories did not make sense appropriately ($F_{1,50}$ (α = .05) = 5.74) (see Figure 4); (5) recognized correctly when the stories were and were not out of order ($F_{1,50}$ (α = .01) = 14.86) (see Figure 5); and (6) had fewer inconsistent responses than the second graders ($F_{1,50}$ (α = .01) = 8.09) (see Figure 6).

In comparing the six presented event sequences, a significant main effect was found on 5 of the dependent measures: (1) using fewer probes ($F_{5,250}$ (α = .01) = 4.68); (2) placing the stories into correct order more often ($F_{5,250}$ (α = .01) = .43); (3) using more mature logical reasoning ($F_{5,250}$ (α = .01) = 17.13); (4) recognizing when the stories did and did not make sense appropriately ($F_{5,250}$ (α = .01) = 2.18); (5) recognizing correctly when the stories were and were not out of order ($F_{5,250}$ (α = .01) = 3.35). There was no significant difference found in event sequences on the inconsistent response measure.

Planned Comparisons

Planned comparisons (Dunn t) were performed to determine whether the specified contrasts of interest comparing story juxta-

Figure 1

Probe Score of Second and Fifth Graders for Each Story Sequence

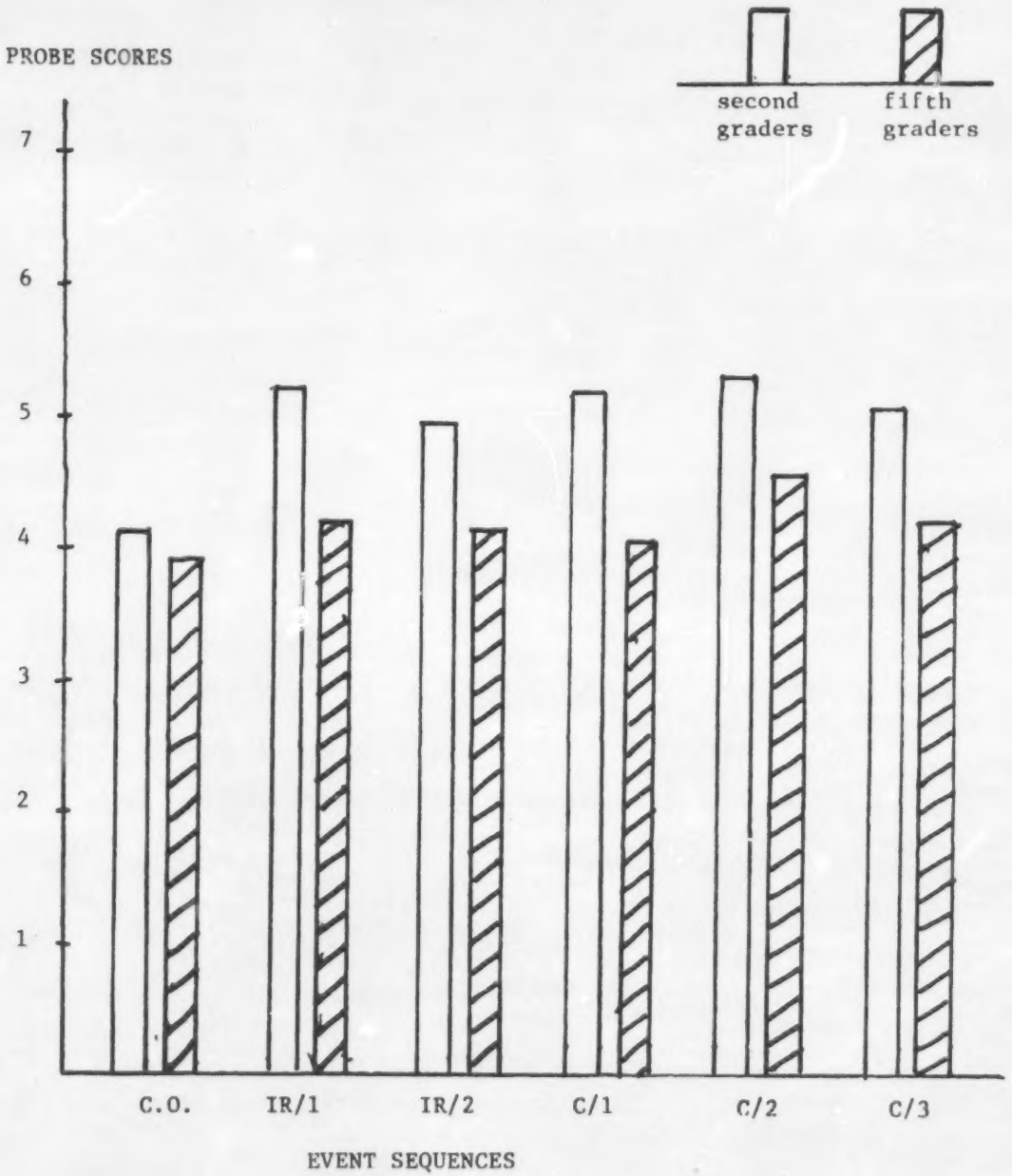


Figure 2

Percentage of Time Stories were Correctly Ordered for Second and Fifth Graders for Each Story Sequence

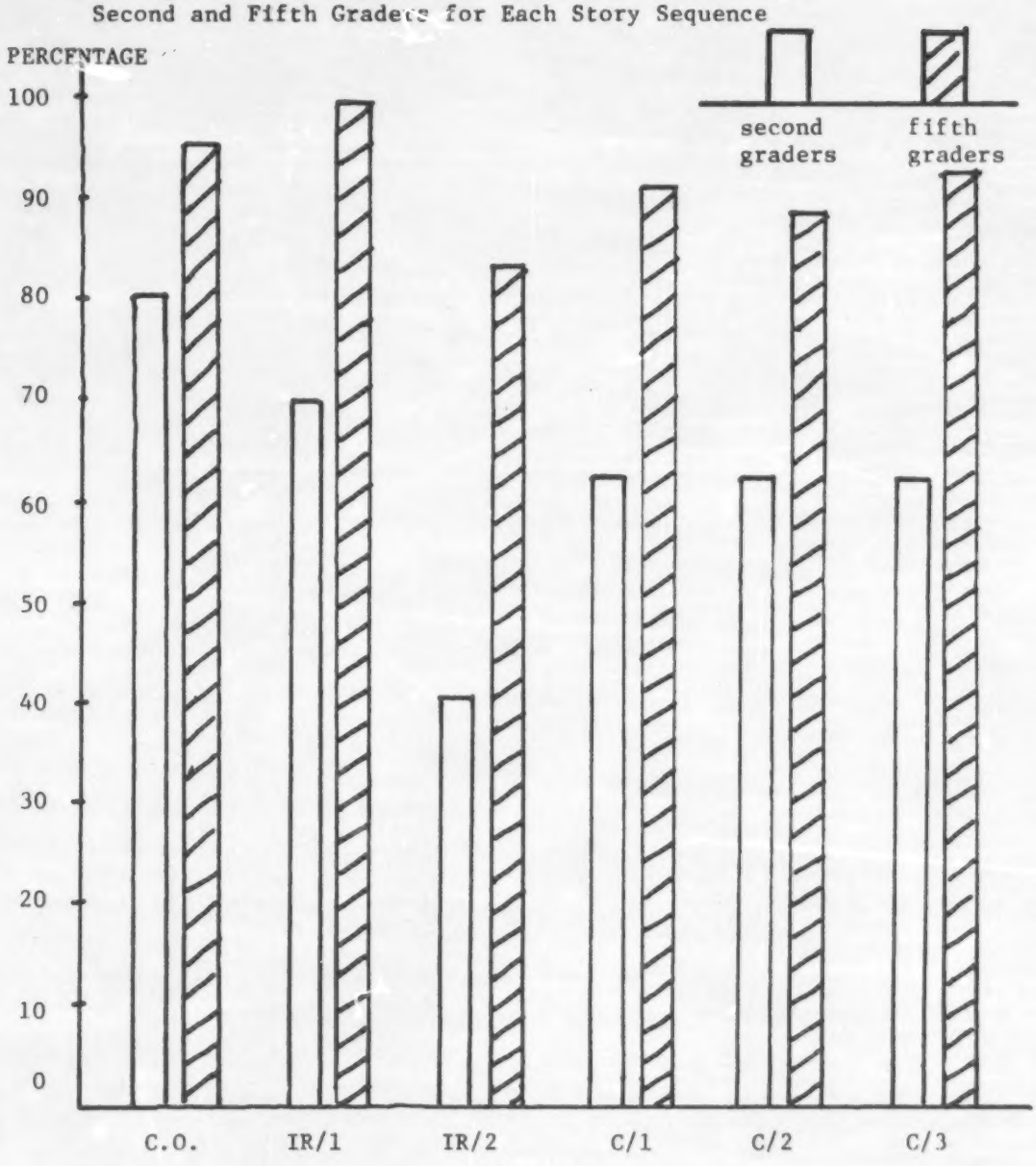


Figure 3

Percentage of Time Children at Each Grade Answered "Yes" to the Probe Question: "Is any part of the story out of order?" for Each Event Sequence

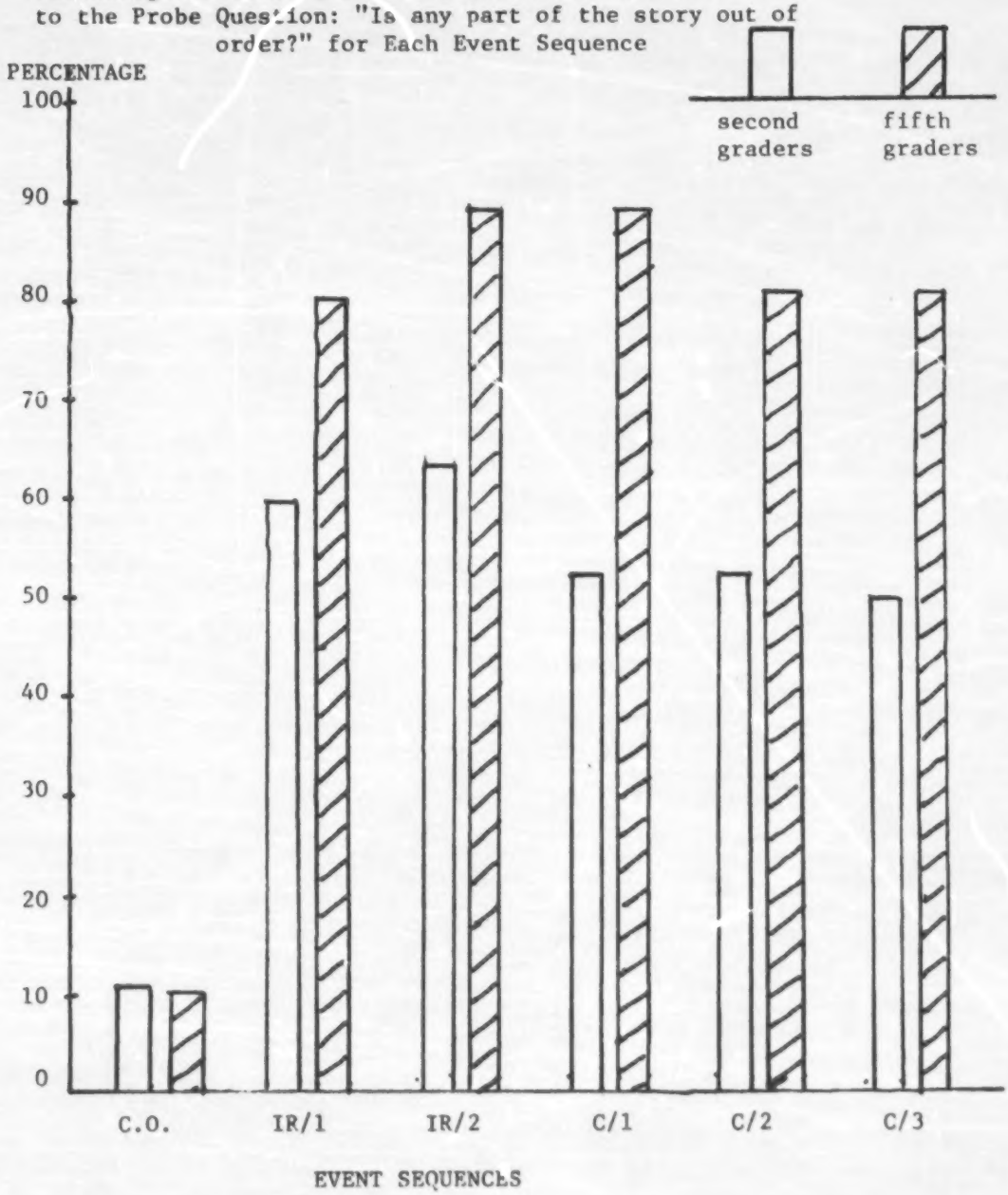


Figure 4

Mean Score for the Logical Sophistication Present in Children's Explanations of the 'Logical Problem' with the Disordered Element for Each Grade and Story Sequence

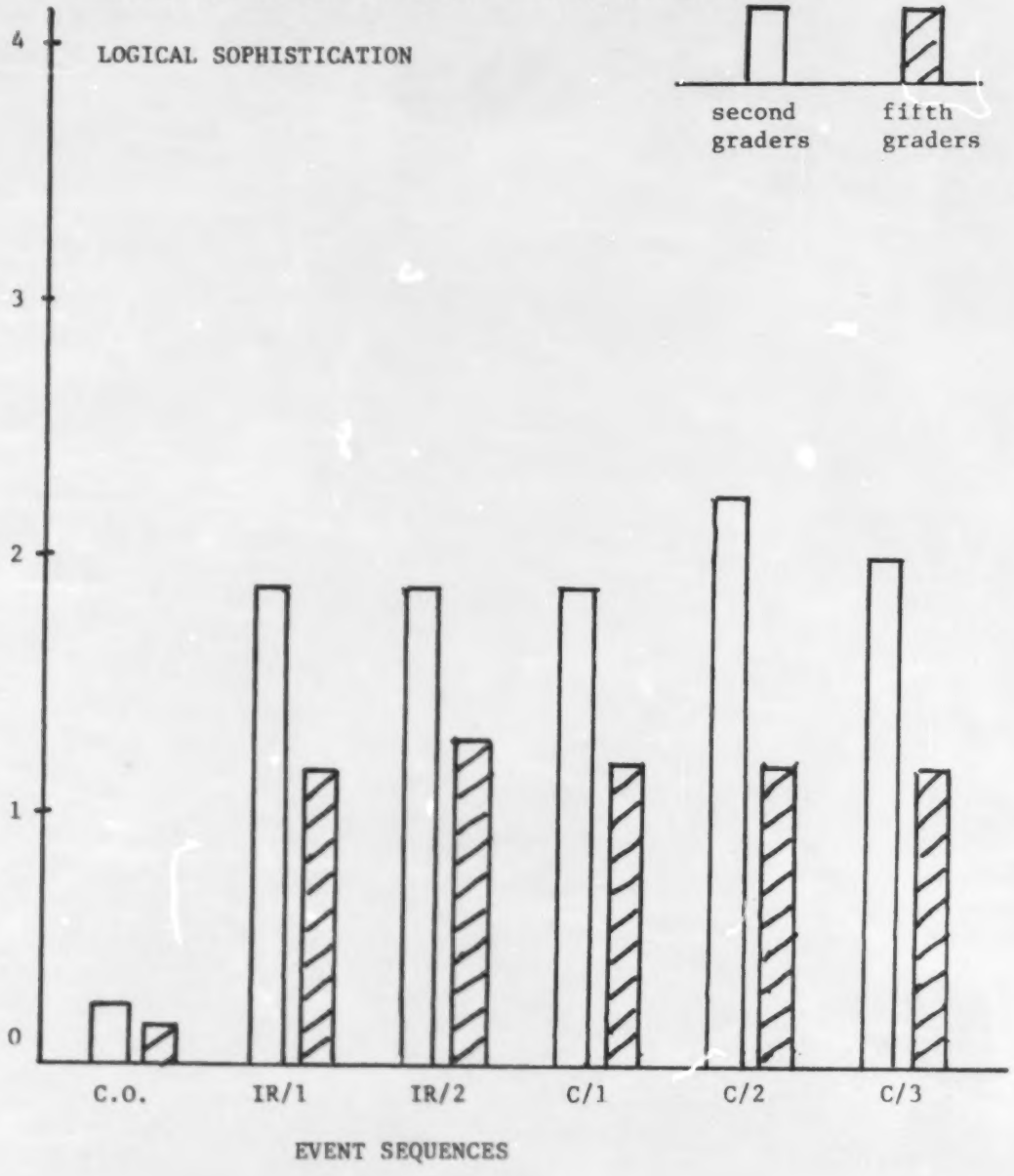
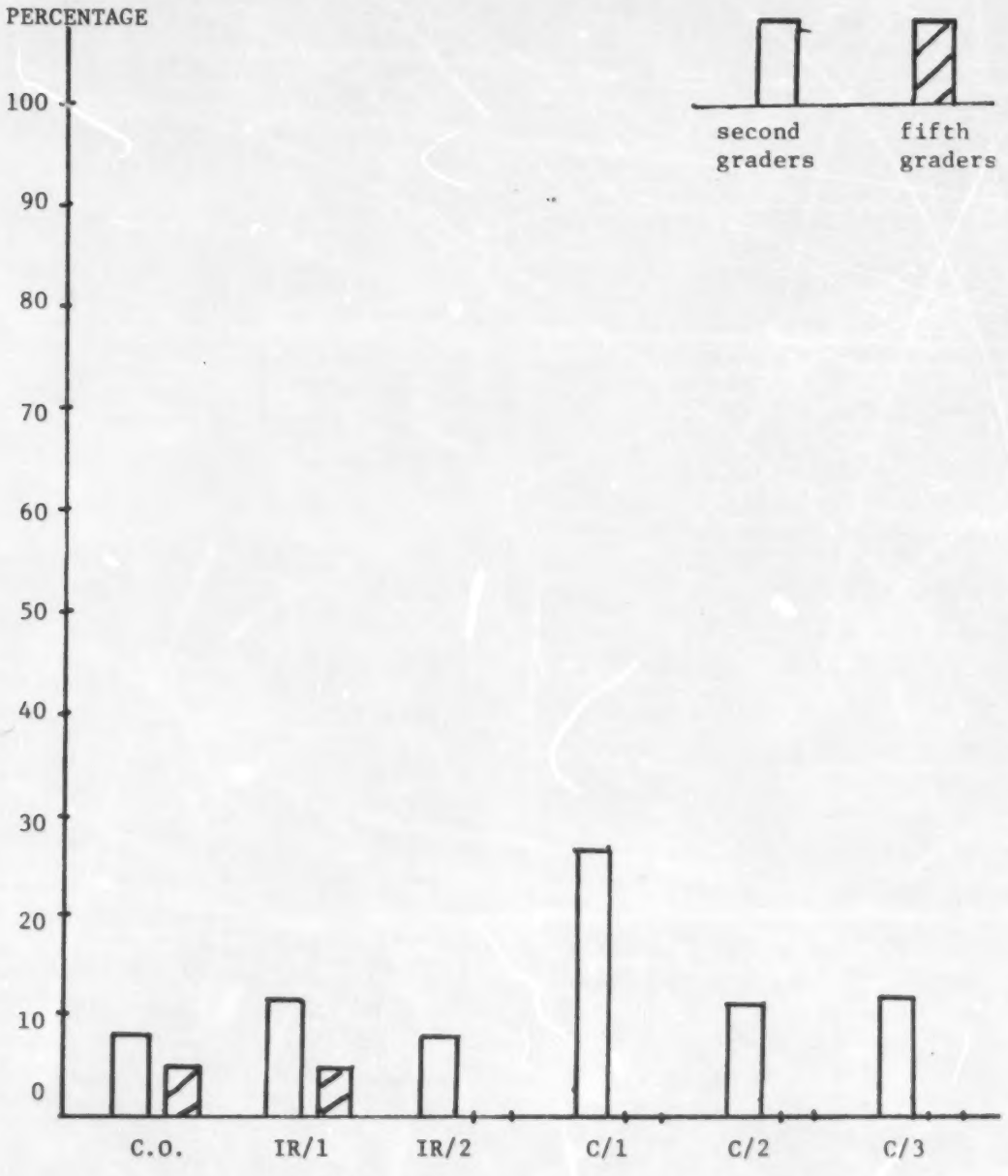


Figure 5

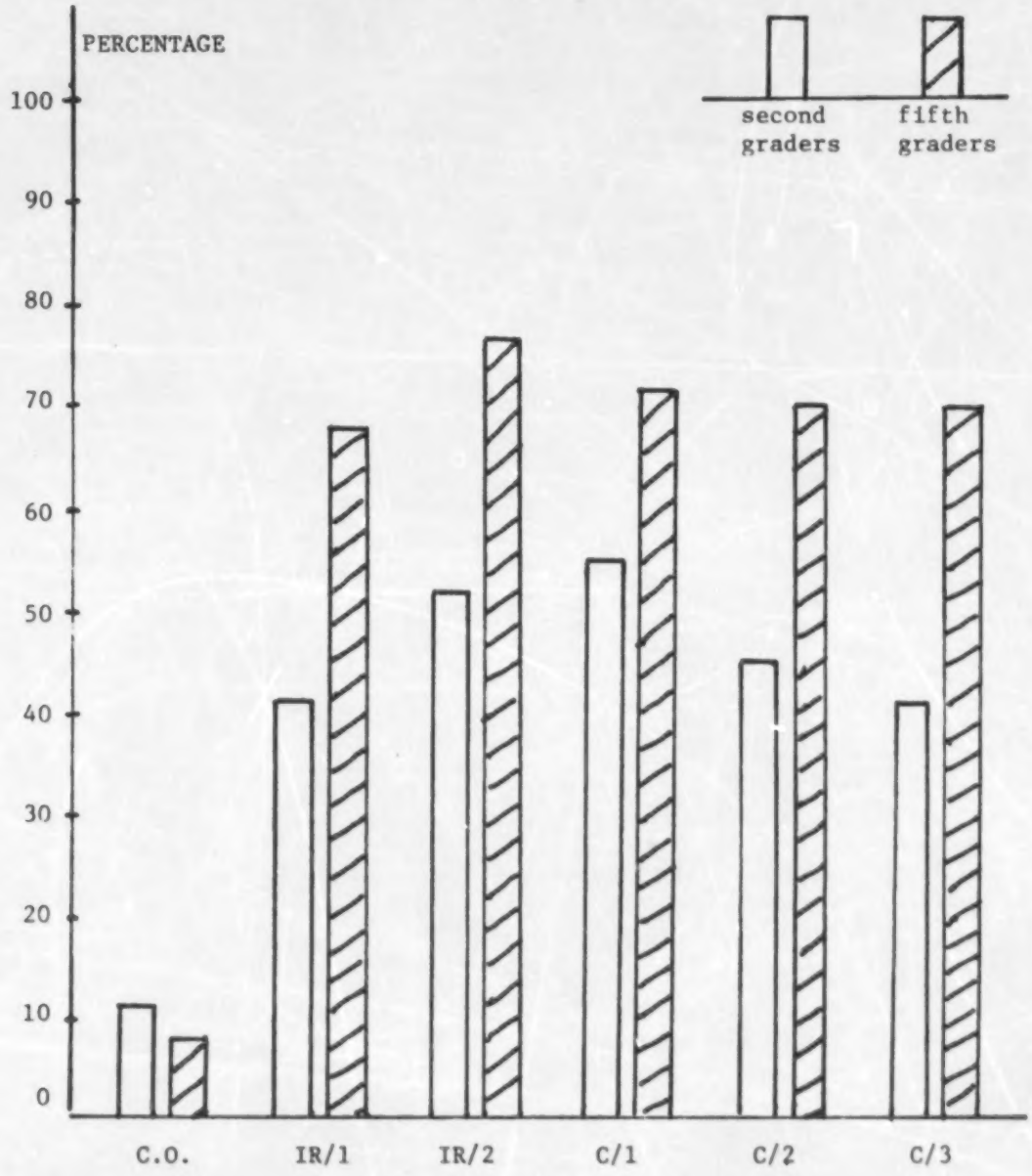
Percentage of Time Children Answered the Series of Probe Questions Inconsistently for Each Grade and Story Sequence



Note: There were no inconsistent responses given by fifth graders for IR/2, C/1, C/2, C/3.

Figure 6

Percentage of Time Children at Each Grade Answered "No" to the Probe Question: "Does the story make sense?" for Each Story Sequence



positions on each dependent measure were significant. The three contrasts of interest were: (1) movement of the internal response one and two positions versus movement of the consequence one, two, and three positions; (2) movement of the internal response one versus two positions; (3) movement of the consequence statement one versus two positions. In each case, a one-tailed Dunn-t was used since there were apriori directional predictions. Each comparison was tested with a Dunn t 3,250 (α = .05) = 2.163. Of all the comparisons made, only one was significant. There was a significant difference in the number of times that the story was reordered correctly when the internal response was moved one versus two positions. When the internal response was moved one position, the story was reordered correctly a significantly greater number of times than when the internal response was moved two positions. In order to explore this significant finding in more detail, this contrast was performed within each grade separately. A significant difference between the movement of the internal response was again found within the second grade, but not within the fifth grade (see Figure 2).

Post hoc Analyses

Post-hoc analyses were used to further explore the significant differences found on the overall ANOVA's. The only significant difference found on the dependent variables, excluding the inconsistent response variable, was between the correct event

sequence of the story and the five juxtaposed event sequences combined ($F_{5,20}$ (α = .01) = 3.02); Scheffe = 5(3.02) = 3.89; probes (F = 16.01); correct ordering (F = 5.79); makes sense (F = 5.86); out of order (F = 92.29); logic used (F = 99.70).

A grade x event sequence ANOVA was performed leaving out the correctly ordered event sequence. Grade differences were found on all six of the dependent measures as before, but story juxtaposition differences were eliminated except on the correct ordering measure ($F_{4,200}$ (α = .05) = 2.46). Stories were correctly reordered more often when the internal response was moved one versus two positions. This was a barely significant finding, but is in accord with the significant differences found through the apriori tests on this same measure.

Correlations Among Dependent Variables

To investigate whether there was a relationship between children's awareness of ill-ordered stories and their ability to construct a good story, a point biserial correlation was computed between probe scores and whether or not the story was placed into the correct ordering within the second grade and within the fifth grade. The correlation with the two grades combined was .306. The correlation for the second grade was .245 and .180 for the fifth grade. All three of these correlations were significant at the α = .05 level ($t_{\infty}(.05)$ = 1.96; t_{2+5} = 5.66; t_2 = 3.19; t_5 = 2.23). The correlations for the second and fifth grades were not

significantly different from each other as reflected by a Fisher r to z transformation ($z = .64$).

These low, but significant correlations can be better understood by looking at tables depicting the number of subjects who placed the stories into correct order based on their probe scores (see Tables 1 and 2). Both second graders and fifth graders noticed the order violation most frequently at probe 4. There was a small difference in the number of subjects who reordered the stories incorrectly at each given probe score. These two factors as well as the low number of incorrect reorderings of the fifth graders help to explain the low correlations found between probe score and correct-incorrect ordering. The tables indicate that there were no stories incorrectly reordered by either second or fifth graders who received probe scores less than 4.

A correlation was computed between probe score and logic score (leaving out the correctly ordered event sequence) to explore the relationship between awareness of order violations, and the ability to explain order violations. With the two grades combined, the correlation was .59. The correlation for the second grade was .62 and .38 for the fifth grade. (Tables 3 and 4 depict the number of observations associated with each given probe score and logic score together.) All three of these correlations were significant at the $\alpha = .01$ level ($t_{\infty}(.01) = 2.59$). The test statistic for the second and fifth grades combined was $t = 12.61$; for the second grade $t = 9.89$; for the fifth grade $t = 5.00$. The correlations for the

Table 1

Frequency with which Second Grade Children Correctly Ordered Stories as a Function of Their Probe Score Classification for that Story

PROBE SCORE	ORDERING	
	Correct	Incorrect
1	1	0
2	5	0
3	3	0
4	45	23
5	14	6
6	25	13
7	10	17

Table 2

Frequency with which Fifth Grade Children Correctly Ordered Stories as a Function of Their Probe Score Classification for that Story

PROBE SCORE	ORDERING	
	Correct	Incorrect
1	2	0
2	8	0
3	14	0
4	82	7
5	13	2
6	18	2
7	1	2

Table 3

Frequency with which Second Grade Children Achieved a Particular Score for the Logic of Their Explanation, as a Function of Their Probe Score Classification

PROBE SCORE	LOGIC SCORE				
	0	1	2	3	4
1		1			
2	1	4			
3	1	2			
4	22	41	1	1	3
5	1	15			4
6		21	9		8
7				2	25

Table 4

Frequency with which Fifth Grade Children Achieved a Particular Score for the Logic of Their Explanation, as a Function of Their Probe Score Classification

PROBE SCORE	LOGIC SCORE				
	0	1	2	3	4
1		2			
2		8			
3		12			
4	23	64	1	2	1
5	1	13			1
6		15		4	
7					3

second and fifth grades were significantly different from each other as reflected by a Fisher r to z transformation ($z = 2.78$). The low correlation for the fifth graders appears to be due to their high usage of sophisticated logic and high frequency of probe score 4 on noticing violations.

DISCUSSION

The hypotheses predicting differences between grades was confirmed by the results. Age differences were found with fifth graders being significantly more aware than second graders of ill-ordered versus well-ordered stories (as depicted by the probe score measure). The fifth graders were also significantly more successful in placing the stories into an order conforming to the Stein and Glenn grammar. These findings suggest that the older children in the study were better able to make use of a story grammar in determining whether the stories were comprehensible and also in constructing stories.

The correlation performed between the probe score and the correct ordering measure was significant at both the second and fifth grade levels, and the two grades were not different from each other. In observing the data it can be seen that none of the stories were incorrectly reordered in either grade when the probe score was less than 4 (see Tables 1 and 2). This suggests that the more aware the child was of the inconsistencies, noticing them early in the probing, the more likely the story was reordered

correctly. In the presented research, the children were required to use their awareness of the order problem to reconstruct the stories. Yussen et al. (1980) predicted that there would be a strong relationship between metacognitive knowledge and actual processing when knowledge was used to guide performance. It is therefore not surprising that the correlations were found significant.

Significant differences were found in the effects of the event sequences on performance of the subjects in both the number of probes necessary to notice the order violations and in placing the story parts into the correct order. It became evident through the post-hoc tests that the significant differences between event sequences was due to a difference between the correct ordering and the juxtaposed orderings. When an ANOVA was performed on the dependent measures, excluding the correct ordering, only one significant finding appeared. This significant finding was on the reordering measure and was consistent with the significant finding in the planned comparisons. In the planned comparisons, a significant difference was found on the reordering measure when the internal response was moved one versus two positions. Stories were correctly reordered more often when the internal response was moved one versus two positions. This finding held true for the second grade, but not the fifth, and was consistent with the hypotheses. The results indicate that the further the distance a category is moved from its place of origin, the more disorganized

the story and the more difficult it is to reorder the story correctly.

Both grade and event sequence differences were found to be significant on the logical reasoning measure. Second grader's logical reasoning was not as sophisticated as the fifth graders' in explaining how they knew that the story was out of order. Through a post-hoc analysis, the significant finding on the event sequence measure was determined to be due to a difference between the correctly ordered event sequence and the five juxtaposed event sequences combined. Therefore, the juxtaposed event sequences did not differentially affect the subjects' responses. The younger children did not appear to be as able as the older ones in using logic to explain why the presented story was out of order. This finding is consistent with Stein and Glenn's (1977b) finding that younger children, although possessing a schema for simple stories are not capable of creating logical structures in simple stories.

The significant difference found between the two grades on the correlation of probe score and logic score further indicates that the second and the fifth graders responded differently in their use of logic. From an inspection of Figure 9, it can be seen that the fifth graders, in contrast to the second graders, were more frequently able to explain why they knew the story was out of order (logic score 4). It can also be noted that as the second graders' probe scores increased, their responses to the logic probe decreased. The fifth graders followed a similar

pattern, but used logical responses more frequently than the second graders.

The results of this study have confirmed that there are grade differences in children's recognition of disordered stories, but the results did not confirm our expectations about the impact of the different story sequences on perceived "well orderedness" or on "sequencing performance." The one significant finding centering on the difficulty of one particular story sequence was consistent with apriori expectations. However, conceptual importance of this result fades when we recognize that it represents only one effect of eighteen planned comparisons that were tested.

The lack of significant differences in the impact of the various disordered event sequences on performance is not consistent with previous research where the primary dependent measure of interest is memory. Research studies, in which significant differences between juxtaposed event sequences have been found, have used recall as an indication of how the individual organizes the story upon retrieval. The lack of significant findings here may be due to the easier retrieval demands that the probing and reconstruction placed on the subjects, providing the researcher with less specific information.

Probes were used in this study as a means of exploring children's awareness of story order. Further explanation is needed to determine what orders are used by children in forming what they consider to be good stories. The interview technique is a good way to explore children's conceptions of well-ordered stories since it puts less demands

on subjects in terms of reading skills and memory capabilities than does construction, recall, or reconstruction of stories. Therefore, the interview technique allows for reading skill and memory differences across grades. As a continuation of this study, future research might attempt to determine what it means to children for a story to make sense and to be in the right order.

Implications

The results of this study indicate that children develop the ability to use their expectations for the format of a story to monitor their comprehension and to construct well-ordered stories. In other words, metacomprehension skills develop as children mature. These findings are similar to Markman's (1978b) suggestion that comprehension and recall are affected by the individual's awareness of the structure of prose. In the presented study, comprehension and the reconstruction of stories was affected by the children's awareness. As children grow older they learn to utilize strategic skills to determine whether there are inconsistencies in a story. The use of metacognitive skills in comprehension is also important in insuring that the reader has correctly interpreted the message.

Reading comprehension could be facilitated in our schools by providing experiences in the classroom for young children which will aid their development of a story schema. This could be accomplished through presenting well-ordered stories, conforming to a grammar, to young children within their reading books. As the

children read well structured stories, they will continue to develop expectations for the ordering of a story. From this experience, strategic skills will be developed.

Strategic skills will develop out of the child's awareness of a story structure. When the child has a firm concept of the structure of a story, he will be able to use his expectations to determine whether the story is comprehensible. The development of strategic skills can be facilitated through exercises in which children are presented stories (some that are comprehensible and others not) and are asked to determine whether the stories make sense. To aid the child in determining where the inconsistencies lie in the story, questions could be asked concerning the content of the story. Metacognitive skills are essential to determining whether we have understood what we have read. The teaching of these skills will aid children in their comprehension of prose.

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APPENDIX A

Story Orders

CORRECT ORDER-C.O.	ORDER 1-IR1	ORDER 2-C2
Setting	Setting	Setting
Initiating Event	Internal Response	Initiating Event
Internal Response	Initiating Event	Consequence
Attempt	Attempt	Internal Response
Consequence	Consequence	Attempt
Reaction	Reaction	Reaction

ORDER 3-IR2	ORDER 4-C1	ORDER 5-C3
Setting	Setting	Setting
Initiating Event	Initiating Event	Consequence
Attempt	Internal Response	Initiating Event
Consequence	Consequence	Internal Response
Internal Response	Attempt	Attempt
Reaction	Reaction	Reaction

APPENDIX B

Setting	Once there was a fish named Albert who lived in a pond near the forest.
Initiating Event	One day Albert was swimming in the pond when he spotted a worm in the water.
Internal Response	Albert knew how delicious worms tasted and wanted one for his dinner.
Attempt	So he swam very close to the worm and bit into him.
Consequence	Suddenly, Albert was pulled through the water. He had been caught by a fisherman.
Reaction	Albert felt sad and wished he had been more careful.

Episode

Once there was a girl named Ann who lived in the country.	
One day a friend that Ann liked asked her to help clean up the yard.	Action
Ann wanted to help and decided to pick up trash lying on the ground.	Cognition
So she picked up some candy wrappers and ran to the trash can.	Action
On the way Ann fell down and hurt her knee.	Action
Ann knew she had rushed and decided to take more time.	Cognition

APPENDIX B (continued)

Once there was a dog named Oscar who lived in a big red house.

One day Oscar ran away from home to a dark forest.

Oscar knew he was lost and wanted to get back home.

So he turned around and followed his footprints that were on the ground.

Finally, Oscar came to the edge of the forest and saw his house.

Oscar was very happy and decided never to run away again.

Once there was a boy named Sid who like to play in his house.

One day Sid's mom gave him a candy treat for drawing a pretty picture.

Sid was happy and wanted to get more candy treats.

So he found all the paper in the room and drew lots of pictures.

Suddenly Sid's mom shouted at him because he had drawn a picture on an important letter.

Sid knew he had been careless and was sorry.

APPENDIX B (continued)

Once there was a boy named Alan who had lots of toys.

One day Alan's sister was playing with his toy car and broke it.

Alan knew that crying wouldn't do any good and that he had to fix his car.

So he went to his father's workbench and got some glue and a brush.

Finally, Alan glued his car together and it was as good as new.

Alan was pleased with himself and forgave his sister.

Once there was a mouse named Melvin who lived in a barn.

One day Melvin found a box of rice crispies under a stack of hay.

Melvin knew how good rice crispies tasted and wanted to eat some.

So he ran over to the box and slipped through a small hole in the side.

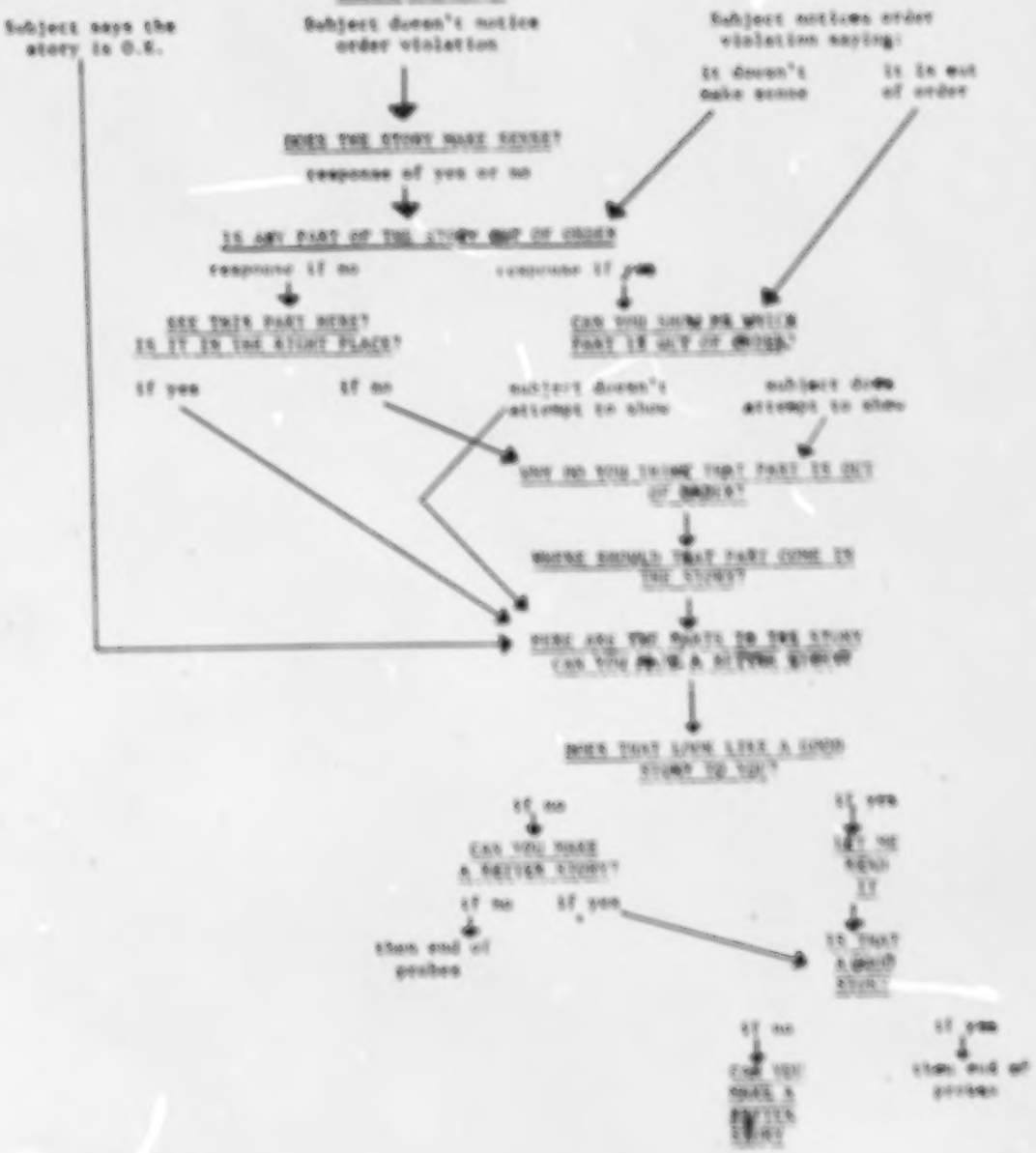
Soon Melvin had eaten all of the rice crispies and was very fat.

Melvin knew that he had made a mistake and was very sad.

APPENDIX C

PROBE QUESTIONS

THAT'S THE STORY


Subject says the story is O.K.
Subject doesn't notice order violation
Subject notices order violation saying:
it doesn't make sense
it is out of order
DOES THE STORY MAKE SENSE?
response of yes or no
response if no
response if yes
SEE THIS PART HERE?
IS IT IN THE RIGHT PLACE?
if yes
if no
subject doesn't attempts to show
subject does attempts to show
WHY DO YOU THINK THAT PART IS OUT OF ORDER?
WHERE SHOULD THAT PART COME IN THE STORY?
if no
if yes
CAN YOU MAKE A BETTER STORY?
if no
if yes
then end of probes